

## Projecting morphology and agreement in Marori, an isolate of southern New Guinea

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This paper is the first detailed investigation on agreement in Marori (Isolate, Papuan, Merauke-Indonesia), highlighting its significance in the cross-linguistic understanding of NUM(BER) expression and in the unification-based theory of agreement. Marori shows PERS and NUM agreement with distributed exponence in DUAL. The paper proposes that DUAL is formed by two basic NUM features (SG, PL) each with its binary values and that DUAL is [-SG,-PL] (unmarked). The novel aspect of the analysis is the idea that the NUM feature is mapped onto a language-specific structured semantic space of NUM. A morpheme is analysed as carrying a feature bundle, with the semantic spaces referred to by the individual features possibly overlapping with each other. The proposed analysis can provide a natural explanation for NUMBER agreement in Marori and can be extended to account for unusual cases of NUM agreement and expression in other languages.

**1. INTRODUCTION.** Marori<sup>1</sup> is a Papuan language (isolate, Trans New Guinea (Ross 2005)). It is spoken by the Marori people in Kampung Wasur, around 15 kilometres east of Merauke, Indonesian Papua.

Marori is under-documented. Previous publications mentioning this language (Boelaars 1950, Wurm 1954) mainly originated from the work of the Dutch missionary Father P. Drabbe, who also published his own work on the languages of southern New Guinea (Drabbe 1954, 1955). Mark Donohue collected a word list and also produced a picture dictionary (Gebze & Donohue 1998). A sociolinguistic survey was undertaken by SIL (Sohn, Lebold & Kriens 2009) on languages around Merauke including Marori.

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<sup>1</sup> Alternative names are Morori, Moaraeri, Moraori, and Morari.

Marori language is highly endangered. There are several fluent speakers left, out of a total of 52 families or 119 people. Marori people typically have mixed marriages with Marind and non-Papuan Indonesians such as the Tanimbar people and currently the Javanese.<sup>2</sup> The sociolinguistic survey carried out in 2000 (Sohn, Lebold & Kriens 2009) reports the precarious nature of the language, which I further confirmed when I did my fieldwork in 2008 and 2009. Young Maroris no longer actively speak their language. They may, however, still have passive competence of varying degrees. They almost all speak Indonesian or the local variety of Indonesian/Malay, and also Marind.

This paper is the first detailed investigation on agreement in this language, highlighting its significance for the unification-based theory of agreement. Marori shows PERS and NUM agreement at the clausal level (between the predicate and its argument) and at the phrasal level (between a noun and its determiner). Of particular interest is the issue of distributed exponence in DUAL expression and agreement. It is proposed that there are two basic NUM features, each with its binary values ([+/-SG], [+/-PL]), and that they are semantically grounded on language-specific structured semantic space of NUM. A morpheme carries a feature bundle which allows the morpheme to refer to different portions of the semantic space. It is demonstrated that DUAL agreement in Marori can be dealt with in a straightforward manner using a unification-based analysis as compositionally [-SG,-PL] (unmarked). The analysis can be naturally extended to cases of DUAL in other languages with more complex NUM systems such as Nen, Hopi and Lariké.

The paper is organised as follows. Section 2 outlines basic facts on clausal organisation and agreement types in Marori. Section 3 starts with the conception of agreement from a lexicalist point of view, followed by the discussion on the nature of agreement in Marori. This section also outlines the proposal pertaining to feature structures with their corresponding semantic space and the analysis of the distributed exponence of NUM. Section 4 demonstrates how the analysis of DUAL in Marori can be extended to account for more complex NUM categories in other languages. Conclusions are given in section 5.

## 2. BASIC FACTS ON MARORI SYNTAX

**2.1. MARORI CLAUSAL SYNTAX IN BRIEF.** The basic clause structure in Marori is shown in figure 1. The verbal structure typically consists of a lexical verb (VERB) and a light or auxiliary (AUX) verb. The AUX verb can be morphologically complex consisting of an AUX root and possibly one or more affixes. This is depicted in figure 2.<sup>3</sup>

[NP\* VERB AUX.VERB]CLAUSE

FIGURE 1

<sup>2</sup> Most of the Javanese people coming to west Papua were originally part of the transmigration program sponsored by the government. They are now the first or second generation born in Merauke, and call themselves Jamer (Jawa Merauke).

<sup>3</sup> Different lexical verbs may take different AUX verbs, depending on lexical classes. This is not discussed in this paper.

PREF-AUX.ROOT-SUFF  
(U) (A)  
(S) (S)

FIGURE 2

Agreement on the (auxiliary) verb is expressed by portmanteau affixes with the prefix showing undergoer agreement and the suffix actor/subject agreement. Table 1 shows free pronouns and their corresponding agreement affixes on the verb. For simplicity, only the actor suffix paradigm in the Past Tense is given.<sup>4</sup>

	FREE PRONOUN	UNDERGOER PREFIX	ACTOR SUFFIX (PAST)
1SG	<i>na</i>	<i>i-</i>	<i>-men</i> 'NonPL'
1NonSG	<i>nie</i>	<i>yar-(&lt;i-ar)</i> 'NonSG.PST/DU.PRES' <i>yor-(&lt;i-or)</i> 'NonSG.FUT/PL.PRES'	<i>-men</i> 'NonPL' <i>-ben</i> 'PL'
2SG	<i>ka</i>	<i>k-</i>	<i>-m</i> 'NonPL'
2NonSG	<i>kie</i>	<i>kar-</i> 'NonSG.PST/DU.PRES' <i>kor-</i> 'NonSG.FUT/PL.PRES'	<i>n- -m</i> '2.NonPL' <i>n- -b ~ -im</i> '2.PL'
3SG	<i>efi</i>	Ø	<i>-m</i> 'NonPL'
3NonSG	<i>emnde</i>	Ø	<i>-m</i> 'NonPL' <i>-b ~ -im</i> 'PL'

TABLE 1. Free pronouns, Undergoer prefixes, and past actor suffixes in Marori

Examples with agreement morphology on the AUX are given in (1).<sup>5</sup> However, certain verbs of high frequency in daily life, e.g. 'sit' and 'bring', often have irregular inflection or the TNS/PERS morphology directly on the verbs, e.g. *-du* '1SG(PRES)'<sup>6</sup> on the verb 'bring/take' in (2).<sup>7</sup>

<sup>4</sup> Abbreviations used in the glosses: 1/2/3 'first/second/third person', A 'actor', ABS 'absolutive', AUX 'auxiliary', DET 'determiner', DU 'dual', ERG 'ergative', F 'female', FUT 'future', M 'male', NonPL 'non plural', NonSG 'non singular', O 'object', NrPST 'near past', PERF 'perfective', PL 'plural', POSS 'possessive', PROG 'progressive', REFL 'reflexive', SG 'singular', PRES 'present', PST 'past', U 'undergoer',

<sup>5</sup> There is no standard orthography for Marori yet. This paper follows the Indonesian-like orthography commonly used by my Marori consultants, e.g. *y* represents the approximant /j/ and *ng* the velar nasal /ŋ/. Consonants with prenasals are written with more than one symbol, e.g. *mb*, *nd*, and *ngg*. Bilabial fricatives are written as *f* (voiceless) and *v* (voiced).

<sup>6</sup> The concept PRESENT in Marori can cover the time NOW (today) and often yesterday.

<sup>7</sup> Auxiliaries and lexical verbs are independent words, each can have their own affixes. When they

- (1) a. *Ka ku=ndo-Ø.*  
 2SG run=AUX.2/3NonPL-NPST  
 'you (sg) will run'
- b. *Nawa payung=i nde=ngge-ben.*  
 1SG umbrella=U buy=AUX-1NrPST  
 'I bought an umbrella.'
- (2) *ujif ke=me=na fis ndon-du tamba yabah ngguo-f.*<sup>8</sup>  
 bird REL=wish =1SG yesterday bring-1SG PERF die AUX.DU-PST  
 'The (two) birds that I wanted to take with me yesterday were already dead.'

Marori shows split intransitivity. The patientive S and Patient/Object is (typically) marked by *=i*.

These examples show the contrast where the patientive S argument *na* 'I' is marked by *=i* (3a) whereas the agentive S must not be marked by *=i* (3b).

- (3) a. *Na=i patar yu-nggo-f.*  
 1SG=U cold 1SG-AUX.1/2-PST  
 'I suffered from cold.'
- b. *Efi ramon (\*=i) ku=ndo-f.*  
 that woman run=AUX.2/3NonPL -PST  
 'She/the woman ran off.'

The split appears to be skewed: only patientive S of states as in (3a) is treated as object-like. Patientive S of motion predicates like 'fall' receives suffix agreement:

- (4) *Nie yanadu purfam pa=saron-den kwi uyow ngge.*  
 1NonPL two person soon=fall-1DU.PRES tree above from  
 'We two are about to fall off from the tree.'

The following examples show that *na* in (5a) functions as Subject appearing without *=i*. In (5b), it functions as object; hence taking *=i*.

- (5) a. *Tamba=na Albert=i keswe=mi-men.*  
 already=1SG Albert=U hit=3SGM.AUX-1NonPL.PST  
 'I already hit Albert.'

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appear together forming phonological words, they are separated by a = (a notation conventionally used for clitics), e.g. *ku=ndo-Ø* in (1). Likewise, the same convention is applied to similar cases such as the free pronoun *na* as in *tamba=na* 'already=1SG' (6) or the beneficiary postposition *na* which can become *=n* forming phonological words with other items as in *na=n=du* '1SG=for=REFL' as in (7b).

<sup>8</sup> A more precise gloss for *ngguo-* would be 'AUX.NonSG.NonPL': the three-way distinction of *nggu* 'AUX.SG', *nggo* 'AUX.PL' and *ngguo* 'AUX.DU' suggests that vowel *-u* attached to the root *ngg-* is actually associated with 'NonPL' and *-o* with 'NonSG'.

- b. *Efi purfam na=i kaswa=ri-ma-m.*  
 that person 1SG=U hit=1-AUX-2/3NonPL.PST  
 ‘The person hit me.’

In a three-place (ditransitive) structure, the Goal/Recipient argument object is marked by =*i*. The verb is inflected showing agreement with this Goal NP, in addition to the agreement with the actor NP.

- (6) a. *Tamba=na Robertus=i bosik nji=me-feri.*  
 already=1SG Robertus=U pig 3M.give=AUX-1.RPST  
 ‘I already gave Robert a pig (a long time ago).’  
 b. *Tamba=na Maria=i bosik njo=mo-fori.*  
 already=1SG Maria=U pig 3F.give=(F.)AUX-1.RPST  
 ‘I already gave Maria a pig (a long time ago).’  
 c. *Robertus/Maria na=i bosik i=mo-fi.*  
 Robert/Maria 1SG-U pig 1SG.give=AUX-2/3.RPST  
 ‘Robert or Maria gave me a pig.’

A beneficiary participant in a three-place predicate is marked by =*na* or =*n*. The verb agrees with the theme/patient, not with the beneficiary NP:

- (7) a. *Maria ka=na di bosik eyew Ø-nda-Ø tanamba.*  
 Maria 2SG=for soon pig see 3-AUX-2/3.NPST now  
 ‘Maria readily hunts a pig for you now.’  
 b. *Nawa fis nandu dakai tawramon.*  
 1SG yesterday na=n=du daka=i taw=Ø-ramon  
 1SG=for=REFL water=U take=3-AUX.1NonPL.PST  
 ‘I bailed water out for myself yesterday.’

**2.2. AGREEMENT TYPES IN MARORI.** Agreement in Marori is of two types: clausal predicate-argument agreement and phrasal noun-determiner agreement.

In the predicate-argument agreement, the core arguments (subject and object) agree in PERS and NUM with either the AUX or the main lexical verb, or both. The first and most common pattern is the one where the AUX is inflected and the lexical predicate remains constant in its form. In the following examples, the AUX is inflected (*nadam*, *ndamon*) whereas the lexical verb *eyew* is not inflected:

- (8) a. *Kie tamba Maria=na bosik eyew nadam.*  
 2NSG PERF M=for pig see Ø-n-nda-m  
 3-2NonSG-AUX-2/3NonPL.PST  
 ‘You (DU) hunted a pig for Maria.’  
 b. *Nawa fis Maria=na bosik eyew ndamon.*  
 1SG yesterday Maria=for pig see Ø-nda-mon  
 3-AUX-NonPL.PST  
 ‘I hunted a pig for Maria.’

Note that the agreement morphology may have distributed exponence within the AUX. This is seen in (8a), where the second person dual actor past tense agreement in *nadam* is formed by the discontinuous formatives *n-* and *-m*, added to the auxiliary root *nda* (cf. table 1).<sup>9</sup>

In the second type the verb itself is inflected to show agreement. This verb is typically associated with activity of high frequency in daily life such as ‘bring’ and ‘sit’. In the following examples, the agreement morphology *-du* is affixed to the verbs.

- (9) a. *Pa=na ka=na ujif nde-du sokodu.*  
 soon=1SG 2SG=for bird bring -1SG.PRES one  
 ‘I (will) bring one bird for you.’
- b. *Nawa kursi uyowé kuye-du.*  
 1SG chair on.top sit-1SG.PRES  
 ‘I sit on a chair.’

The third type is inflection on both the lexical predicate and the AUX. This is the case with predicates that encode certain qualities such as ‘red’ and ‘big’. These predicates are inflected for NUM showing opposition of SG and NonSG. The inflection may be morphologically regular (e.g. *para* ‘red’ → *para-won* ‘red.SG’; *para-nde* ‘red.NonSG’) or suppletive (e.g., *siel* ‘big.SG’; *kofe* ‘big.NonSG’ *monjun* ‘small.SG’, *menindum* ‘small.NonSG’).

Consider the following examples:

- (10) a. *Efi nam pu para-won te.*  
 3SG POSS hair red-SG be.(3NonPL.)PRES  
 ‘Her/his hair is red.’
- b. *Emde usindu nam pu para-nde te-re(re).*  
 3NonSG PL POSS hair red-NonSG (3)be-PL.PRES  
 ‘Their (PL) hair is red.’

Sentence (10a) shows singular agreement, where the singular suffix *-won* must be used on the lexical predicate *para* ‘red’ and the auxiliary shows third person NonPL (i.e., Ø) morphology. Sentence (10b) is the counterpart sentence that shows plural agreement. The NonSG *-nde* is used on *para* ‘red’ and the suffix *-re(re)* on the auxiliary.

In addition to the predicate-argument agreement just outlined, Marori shows agreement between the determiner and the noun head in the noun phrase. The determiner in Marori shows an opposition of SG vs. NonSG: *efi* ‘DET.SG’ vs. *emnde* ‘DET.NonSG’.

- (11) a. *efi ramon sokodu* ‘the (one) woman’  
 DET woman one

<sup>9</sup> The form *nadam* is analysed as having an underlying form *n-nda-m*. The form *nadam* involves epenthesis vowel harmony with the consonant *nd* of the auxiliary *nda* becoming *d*. The prenasal part perhaps becomes the coda of the first syllable (*nan.dam*) which is then weakened and lost (*na.dam*).

- b. *emnde*      *ramon*      *yanadu*      ‘the two women’  
      DET.NonSG woman      two
- c. *emnde*      *ramon*      *usindu*      ‘all of the women’  
      DET.NonSG woman      all

**3. PROJECTION ISSUES IN AGREEMENT AND PROPOSED ANALYSIS.** Before discussing the issues posed by agreement in Marori and the proposed analysis, it is useful to have a brief review of the lexicalist approach to agreement.

**3.1. A LEXICALIST THEORY OF AGREEMENT.** While specific details and mechanisms are different, all theories of agreement operate on the same principles: compatible or same features are allowed to pass through in the formation of larger syntactic structures whereas incompatible ones are not. In a lexicalist non-derivational framework of grammar, e.g. LFG (Bresnan 2001, Dalrymple 2001, Falk 2001) and HPSG (Sag, Wasow & Bender 2003), the mechanism is done via unification of features. Features of the same or compatible values will successfully unify. This can be informally represented in figure 3 for a language like English that requires subject-verb agreement. The NUM feature of [NUM SG] carried by SUBJ NP will become [SUBJ [NUM SG]]. It then unifies with the same feature carried by the verb, as shown figure 3b. If the verb has different, incompatible value, then the unification fails. The feature clashes, indicated by a star in figure 3c.

a.	[SUBJNP		VP]clause	
b.	[SUBJ[NUM SG]]	U	[SUBJ[NUM SG]]	= [SUBJ[NUM SG]]
c.	[SUBJ[NUM SG]]	U	[SUBJ[NUM PL]]	= *

FIGURE 3

The challenge is how to develop a linguistically motivated feature structure that can capture the complex patterns of agreement in a particular language and across languages. I argue that NUM features and their structures must be mapped onto the semantic space of NUM which must be established on a language-specific basis. This is further discussed in sub-section 3.3.2 below.

A theory of agreement must also be able to deal with intricacies of different types of agreement including indeterminacy as in case agreement (Dalrymple, King & Sadler 2009) and the domains/relations involved. There are at least three, often inter-related, kinds of agreement: grammatical, semantic and pragmatic (Wechsler & Zlatic 2000, Kathol 1999, Pollard & Sag 1994).<sup>10</sup>

<sup>10</sup> Pollard and Sag (Pollard & Sag 1994) also discussed honorific agreement, e.g. in Japanese and Korean. This type of honorific agreement is also encountered in Balinese, analysed as pragmatic

In grammatical agreement (CONCORD), the agreeing units share grammatical features. Purely syntactic features, e.g. NOM case, are features required by the grammar to encode syntactic relations. For example, grammatical agreement is observed in the Serbo-Croatian NP in (12) where the determiner and adjective agree in case (in addition to gender and number) with the head noun:

- (12) *ov-a*                      *star-a*                      *knjig-a*  
       this-NOM.F.SG    old-NOM.F.SG    book(F)-NOM.SG (Wechsler & Zlatic 2000)

In semantic agreement, the agreeing units share referential indices: PERS, NUM, GEND. These features are essentially semantic because they indicate referents in the external world. However, they are also often grammaticalised in many languages, and are often tied to grammatical features. For example, they are often expressed by a portmanteau morpheme. Thus, the SUBJ-VERB agreement in English is grammatical as well as semantic, because we have cases like *committee are/is* ... or where the noun *committee* can have singular or plural interpretation. The two interpretations allow singular and plural agreement on the verb. The plural agreement shows the agreement with the plural referents of the subject, despite the form of the subject noun being singular.

Note that agreement in English is also grammatical in the sense that the agreeing SUBJ is obligatorily required by the verb and that the agreement verbal morphology makes reference to the syntactic property of subjecthood.

Pragmatic agreement, also called anaphoric agreement (see footnote 11), is a case of co-referential elements which show compatible referential properties. Pragmatic agreement is typically not constrained by certain syntactic domains. Cases showing left dislocation as in English (13a) below belongs to pragmatic agreement. Agreement of the type shown in (13b) from Kambara (an Austronesian language of Sumba, Indonesia) where the free NP subject is optionally present also belongs to anaphoric agreement.<sup>11</sup>

- (13) a. *John, I like him very much.*  
       b. (*I*                      *Ama*) *na-kei-nja*                      *ri.*  
           ART            father 3sN-buy-3pD                      vegetable                      (Klamer 1996)  
           ‘Father buys vegetables for them.’

Predicate-argument agreement in Marori is, as we shall see in the next sub-section basically semantic-pragmatic in nature.

**3.2. THE NATURE OF AGREEMENT IN MARORI.** Agreement in Marori is not grammatical, but semantic-pragmatic in nature. It is not grammatical because the agreement features (NUM and PERS) are essentially referential (hence, semantic) in nature. In Marori, these features are not grammaticalised to become part of an agreement system that makes reference

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agreement in Arka (2005). Bresnan & Mchombo (1987) distinguish grammatical and anaphoric agreement.

<sup>11</sup> The distribution of a resumptive pronoun which is a case of anaphoric agreement may be also constrained to a certain degree by termhood/coreness of arguments. For example, resumptive pronouns in Balinese (Arka 2003) are restricted to core arguments (Subject and Object).



Grammatical agreement requires that the agreeing NP be obligatorily present. This is not the case with Marori. The free NP that the verb agrees with is often dropped (i.e. optionally present). This is shown in the following examples, extracted from the Frog story<sup>12</sup> in Marori. Sentence (14c) comes with no free A/U NPs. The agreement morphology on the verb, both of which are zero formatives, anaphorically refers to the NPs mentioned earlier in the texts ('the dog', 'Thomas', and '(the) frog')<sup>13</sup>

- c. *Mbe*      *tanamba*      *eyew=Ø-nda-Ø-fi*.  
 PROG      now      see=3-AUX-2/3NonPL-RPST  
 ‘(They were (two)) now looking for (it) (i.e., the frog).’

b. *Emnde usindu Maria=na bosik eyew ndim.*  
 3NonSG all Maria=for pig seeØ-nda-im  
 3-AUX-2/3PL.PST  
 ‘They (all, more than two) hunted a pig for Maria.’

<sup>13</sup> Inflection showing tense in Marori is complex. There is more than one way of doing it, and syncretism adds to the complexity. Past tense for 2/3 Actor, for example, can be expressed by adding the suffix *-f* (PST) or *-fi* (typically remote past (RPST)) as seen in (13c), or adding *-m* 'NonPL' as in (7a) (see also table 1).

(16) a. *Kie tamba Maria=na bosik eyew ndam.*  
 2NonSG PERF Maria=for pig see Ø-n-nda-m  
 3-2NonSG-AUX-2/3.NonPL.PST  
 ‘You (DU) hunted a pig for Maria.’

b. *Kie usindu Maria=na bosik eyew nedim.*  
 2NonSG all Maria=for pig see Ø-n-nda-im  
 3-2NonSG-AUX-PL.PST  
 ‘You (all, more than two) hunted a pig for Maria.’

c. *Ka Maria=na bosik eyew ndam.*  
 2SG Maria=for pig see Ø-nda-m  
 3-AUX-2/3.NonPL.PST  
 ‘You (SG) hunted a pig for Maria.’

**3.3.1. What is projection?** The notion of projection is one of the central concepts in modern syntactic theories. It refers to the mechanism by which a (sub-)unit of a structure determines or constrains a larger (syntactic) structure which it is a part of, or a structure it is related to. Thus, one can talk about (lexical-)categorical projection, e.g. a verb (V) (in the lexicon) is projected to verb phrase (VP) in syntax. In Chomskyan terms, the EPP (Extended Projection Principle) is proposed to ensure that the verb which is projected to syntax must have an NP in the subject position (Chomsky 1981). In the LFG model (Dalrymple 2001), the term ‘projection’ refers to mapping or correspondence between layers of structures.

Of particular interest are the projection issues in relation to the agreement patterns presented earlier. Adopting a traditional view where morphology and syntax are two different but related domains of grammar, we have the following questions: how do we maintain the distinction while at the same time capture the idea that the same principle applies across boundary of morphology and syntax? Regarding NUM agreement, what can we learn from Marori in relation to the feature structure of NUM? What is the best analysis, and to what extent is the analysis applicable to other languages?

In what follows, I address these questions. I propose a lexically-based analysis for NUM agreement in Marori where DUAL is not primitive. I sketch how the proposed analysis can be extended to account for complex NUM systems in other languages.

**3.3.2. Proposed feature structure and claims.** The points of the analysis are the following. First, following Hale (1997), I adopt the analysis that SG and PL features are the most basic NUM features. Each has a binary value (+/-) as shown in figure 4a.

- a. NUM = {[+/- SG], [+/-PL] }  
 b. DUAL = [-SG, -PL] (where [-SG] is NSG and [-PL] is NPL)

FIGURE 4

Second, on the basis of figure 4a, the DUAL in a three-way NUM system as observed in Marori (SG, DU, PL) is analysable as being formed out of these basic NUM features, namely [-SG, -PL]. This is shown in figure 4b.

Third, as seen from feature specification in figure 4b, DUAL is unmarked. It is formed out of a combination of two features with negative values.<sup>14</sup> There is evidence from Marori that DUAL is indeed encoded by two underspecified morphemes, e.g. *n- -m* in (16) glossed as NonSG and NonPL respectively. There is also evidence from Nen (a Papuan language of southern New Guinea) where certain verbal stems expressing DUAL are unmarked and the formation of SG/PL is achieved by having additional marking on these stems.

Fourth, while a specific number morphology signals the presence of a number feature, I claim that the absence of number morphology associated with a form does not mean that the form contributes no number feature. What number information is contributed by the form is lexically determined within the larger system of the language. For example, the demonstrative *this or that* in English can be analysed as carrying [NUM [PL -]] because a demonstrative is part of the nominal category in English where plural is morphologically marked. Hence, in our analysis *this/that* carries [PL -]<sup>15</sup> (and is compatible with a noun carrying [PL +] such as *children*. The definite article *the*, however, does not enter into

<sup>14</sup> Harley & Ritter (2002) provide an analysis where dual is universally associated with positive specification of both Minimal and Group (semantic) features, roughly corresponding to ‘singular’ and ‘plural’ with evidence, for example, coming from Hopi. In this language, dual is expressed by both singular and plural forms. Evidence from Papuan languages as discussed in this paper, however, shows that dual is expressed distributively by two NonSG and NonPL morphemes supporting the analysis that their SG and PL features carry negative values.

<sup>15</sup> One might want to analyse that English singular nouns and demonstratives *this/that* carry [SG +]. While this is intuitively reasonable, there are good reasons why this analysis is untenable. It would mean that singular is morphologically marked in English (i.e. there is a dedicated morphology to mark singular which is not the case). (The third person singular present tense -s is not solely for number.) In addition, it would lead to an unwanted outcome in the unification process, allowing unacceptable structure with feature unification of [NUM [SG +, PL +]] in English such as in *\*this children*.

number contrast in English and therefore carries no number feature.

The fifth, key and new, proposal is the modelling and conception of NUM system. I argue that the NUM system must be understood as reflecting language-specific categorisations of the semantic space of NUM, and that NUM features are distinguished and structured on the basis of the corresponding structures of the relevant NUM spaces to which they are mapped onto.

I therefore claim that feature operations to establish NUM referents are determined or constrained by the semantic space of NUM of the language. This allows us to provide a natural explanation for certain cases which appear to be unusual, e.g. the coding of exhaustive set/plural or paucal using SG/DUAL morpheme in Nen (discussed in section 4.1 below). In the proposed analysis, different interpretations of PL, which may or may not include the meaning of DUAL/TRIAL as in Larike (discussed in section 4.3) also follow naturally.

To begin with, the simplest model of pairing between (NUM) FORM and its corresponding semantic space (MEANING) is arguably the one shown in figure 5 below. (I will show later that the MEANING part is richly structured with possible overlapping spaces.) The line with an arrow at the end associated with PLURAL is meant to capture the idea that plurality is quantitatively unspecified. In contrast, singularity (i.e. being ‘one’) is quantitatively specific; hence no arrow is represented at the end of NUM space.<sup>16</sup>

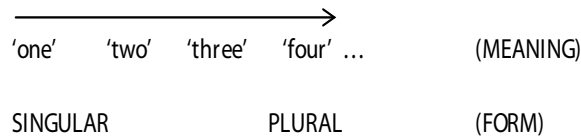


FIGURE 5

Languages differ in the way the space between the two ends is divided and encoded linguistically. To capture the differences and similarities, it is necessary to represent the internal structure of the space explicitly, from which the abstraction of atomic NUM features ([+/-SG] and [+/-PL]) can be postulated. To illustrate the points, the NUM system in Marori is compared with that of English. English is simpler and is discussed first.

English has a two-way NUM system showing SG ('one') vs. PL ('more than one') opposition. It is the PLURAL category that is morphologically marked in this language on nouns. That is, there is a dedicated PLURAL morpheme in English. Given that PL has a binary (+/-) value and that SG is analysable as [-PL], the simplest analysis is that English

<sup>16</sup> Note that we are talking about NUM in natural language semantics. In mathematical sense, one can talk about spaces below one or zero (i.e. minuses), in which case there should be an arrow specified for the line. For simplicity, I also ignore the complication in the conception of NUM in 'mass' nouns, where the FORM is SINGULAR but it does not refer to an individuated 'one' entity, e.g. English *water* and *air*.

employs one NUM feature only, namely the PL feature. The schema figure 6 represents the mapping of the PL feature onto the semantic space of NUM in English. As seen, the feature [+PL] carried by a PLURAL form maps onto a NUM space covering ‘more than one’, indicated by a thick line in the arrow. A SINGULAR form analysed as carrying the [-PL] feature, which is mapped onto ‘one’.

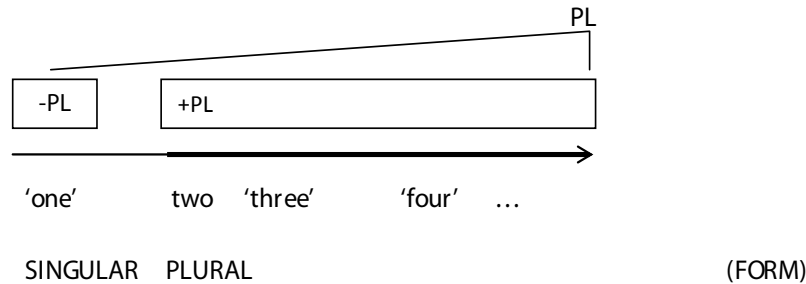


FIGURE 6. The semantic space of NUM in English

Marori, however, has a three-way NUM system: SG, PL and DUAL. Given the fact that both the SG and PL have their marking on the verb in Marori, we can say that Marori activates both SG and PL features in its system. Unlike in English where SINGULAR is [-PL], Marori's SINGULAR is indeed associated with the SG feature. Thus, the semantic space of NUM in Marori can be represented in figure 7. Both SG and PL features with their respective binary values are present in Marori and mapped onto the NUM space.

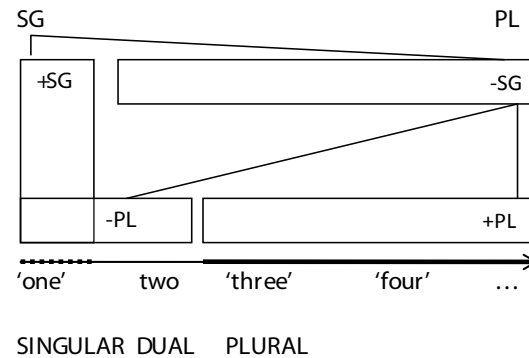


FIGURE 7. The semantic space of NUM in Marori

The NUM space of Marori needs some explanation. The features are hierarchically structured. The +PL feature is embedded in the [-SG] feature value. This is to capture the intuition that the first high-order distinction is between SG vs. NonSG. We have seen that there is morphological evidence for this in Marori: the distinction is expressed by two distinct morphemes (with complexity in the verbal morphology as seen in table 1). There is also evidence from other languages, e.g. Lariké (discussed in section 4 below) where PL is understood in its broad sense as ‘non-singular’ (i.e. also covering ‘dual’), in addition to

its narrow sense of ‘three or more’.

The analysis as shown in figure 7 allows us to account for facts about distributed exponents in NUM expressions in Marori (and also in other languages). We can straightforwardly account for the economical way of encoding of DUAL in Marori by means of combining the available NonSG ([-SG]) and NonPL ([-PL]) morphemes.

However, it should be noted that the three-way number distinction in Marori can also be encoded by distinct forms, typically for the first person in the present/future tense. These forms are often associated with partially irregular lexically-determined paradigmatic patterns, e.g. *-du*, *-den*, *-men*, and *-ru*, *-ren* and *-men* for the first person singular, dual and plural categories in present and future tenses as shown in (17)(a-b). For the past tense as seen in (17c), *-men* is used for the first person irrespective of the number, in contrast to the second and third persons.

- (17) a. The paradigm of the (auxiliary) verb ‘be.at/sit’ in the present tense in Marori

	1	2	3
Singular	<i>kuyedu</i>	<i>kami</i>	<i>kuye</i>
Dual	<i>kuyeden</i>	<i>kanermi</i>	<i>kuye</i>
Plural	<i>minggemen</i>	<i>kaminenggem</i>	<i>minggri</i>

- b. The paradigm of the (auxiliary) verb ‘be.at/sit’ in the future tense in Marori

	1	2	3
Singular	<i>miru</i>	<i>kami</i>	<i>mi</i>
Dual	<i>miren</i>	<i>kanermi</i>	<i>mi</i>
Plural	<i>minggemen</i>	<i>kaminenggem</i>	<i>minggem</i>

- c. The paradigm of the (auxiliary) verb ‘be.at/sit’ in the past tense in Marori

	1	2	3
Singular	<i>kuyemen</i>	<i>kuyem</i>	<i>kuyem</i>
Dual	<i>kuyemen</i>	<i>norowem</i>	<i>kuyem</i>
Plural	<i>mingrimen</i>	<i>minenggrim</i>	<i>minggrim</i>

While the dual forms *-den* as in *kuyeden* and *-ren* as in *miren* encode number, they are actually portmanteau morphemes that also encode specific person and tense (i.e. present/future) information. Therefore, they are in a sense not really dedicated DUAL number morphemes. Given the overall system of number in Marori, we can still maintain the analysis that there is no need to have a DUAL feature in this language. DUAL morphemes such as *-den*, while glossed as DU(AL) for simplicity can be specified as carrying [-SG, -PL] as part of feature bundles [1, -SG, -PL, PRES] features; i.e., meaning a first person dual present tense morpheme. The analysis accounts for the fact that the auxiliary it is affixed to (e.g., *kuyeden*) can enter into subject agreement with *nie* ‘1NonSG’ as in (18) because the subject carries the same feature value [-SG] with which it can unify. The mechanism of unification is further discussed in section 3.3.3 below.

- (18) *Nie purfam Jayapura di kuye-den.*  
 1NonSG person Jayapura soon be.at-1DU.PRES  
 ‘we (two) are in Jayapura soon.’

To conclude, there is good evidence to support the analysis that the three-way NUM system in Maori has two basic NUM features, SG and PL, with binary (+/-) values. The feature bundles in Marori are represented in figure 8.

SINGULAR	DUAL	PLURAL	(NUMBER CATEGORIES)
[SG +] [PL -]	[SG -] [PL -]	[PL +] [SG -]	(FEATURE BUNDLES)
SG	NSG&NPL	PL	(MORPHOLOGICAL CODING)

FIGURE 8. NUM system in Marori

**3.3.3. Distributed NUM exponence across morphology and syntax.** Having discussed the feature structure, we are now ready to discuss the issue of distributed NUM exponence further, in a principled and precise way. This can be straightforwardly done within the unification-based model of grammar as described in 3.1. In what follows we discuss and exemplify how DUAL is arrived at in morphology and syntax.

Consider example (19a) where the Actor ‘you’ is DUAL. Its NonSG exponents come from syntax (the free pronoun *kie* ‘2NonSG’) and morphology (the affixes *n-* and *-m* in the verb). These morphemes carry the NUM feature with compatible values which then unify to form DUAL. The unification is shown in (19b).

- (19) a. *Kie tamba Maria-na bosik eyew nadam.*  
 2NonSG PERF M-for pig search Ø-n-nda-m  
 3-2NonSG-AUX-2/3.NonPL.PST  
 ‘You (DU) searched for a pig for Maria.’

$$b. \begin{array}{c} [\text{NUM} [\text{SG} -]] \\ kie \end{array} \cup \begin{array}{c} [\text{NUM} [\text{SG} -]] \\ n- \end{array} \cup \begin{array}{c} [\text{NUM} [\text{PL} -]] \\ -m \end{array} = \left[ \begin{array}{c} \text{NUM} \left[ \begin{array}{c} \text{SG} - \\ \text{PL} - \end{array} \right] \end{array} \right]$$

The formation of DUAL can take place in the lexicon and syntax. In (19), it is formed by the unification of *n-* and *-m* when the verb *nadam* is created. When the verb *nadam* combines in syntax with the free pronoun *kie*, the NUM information from these units further unifies. The verb *nadam* is not acceptable if the actor is singular *ka* ‘2SG’, for which the verb *ndam* must be used as seen in (19c). The unification fails because *ka* carries [NUM [SG +]] feature which is incompatible with that carried by *n- -m* (19d).

- c. *Ka Maria=na bosik eyew ndam / \* nadam.*  
 2SG Maria=for pig see Ø-nda-m  
 3-AUX-2/3.NonPL.PST  
 ‘You (SG) hunted a pig for Maria.’

$$d. * \begin{array}{c} [\text{NUM} [\text{SG} +]] \\ ka \end{array} \cup \begin{array}{c} [\text{NUM} [\text{SG} -]] \\ n- \end{array} \cup \begin{array}{c} [\text{NUM} [\text{PL} -]] \\ -m \end{array} = \left[ \begin{array}{c} \text{NUM} \left[ \begin{array}{c} \text{SG} - \\ \text{PL} - \end{array} \right] \end{array} \right]$$

In (20), DUAL is formed in syntax, not in morphology. Unlike in *nadam* (19), there



is no NonSG affix in the verb morphology of *ndam* to make DUAL. The verb *ndam* emerges from the lexicon searching out its Actor and Undergoer arguments, and the NUM information ([PL -]) from the actor suffix *-m* unifies with the NUM information from the free pronoun *emnde*, giving rise to DUAL. The unification is shown in (20b).

- (20) a. *Emnde na-n bosik eyew ndam.*  
 3NonSG 1SG-for pig search Ø-nda-m  
 3-AUX- 2/3.NonPL.PST  
 ‘They (two) searched a pig for me.’
- b. 
$$\begin{array}{ccc} \text{[NUM [SG -]] U} & \text{[NUM [PL -]]} & = \\ | & | & \left[ \text{NUM} \left[ \begin{array}{c} \text{SG -} \\ \text{PL -} \end{array} \right] \right] \\ \text{emnde-} & \text{[ -m]_{VERB}} & \end{array}$$

The unification-based feature analysis of Agreement presented above shows the following points. First, it allows us to maintain the traditional distinction of morphology and syntax and at the same time also to capture the projection of morphology to syntax whereby referential information (in this case NUM values) can pass up across the boundary of morphology and syntax. Second, (NUM) agreement is essentially feature value compatibility, which operates on the basis of the same principle irrespective of whether it takes place in a clause or a word level. Third, with features being mapped on the semantic space of NUM, we can also capture the fact that agreement is more than simply compatibility of features. Given the NUM space of figure 7, the agreement is functional because when [SG -] and [PL -] combine, they narrow down to select the NUM space of DUAL.

**4. TYPOLOGICAL NOTES.** A typological space of NUM is proposed in subsection 3.3.2. PL and SG are the basic NUM features with binary values (+/-). Languages vary with respect to whether one or both of them are activated. It has been argued that the feature structure is hierarchical with +PL being embedded in [-SG] and that DUAL is negatively defined as [-SG, -PL].

The question now is whether the proposed analysis of DUAL in Marori can be extended to account for DUAL in other languages, possibly in those with richer NUM distinctions (e.g. trial or paucal). Discussing these in depth across languages is beyond the scope of the present paper. However, in what follows, I discuss DUAL in three other languages: Nen (Papuan), Hopi (Uto-Aztecan, US) and Larike (Austronesian, Maluku-Indonesia).

**4.1. DUAL IN NEN.** DUAL in Nen (Evans 2009, this volume) is unmarked; Non-DUAL (ND) is marked, e.g. *owab* ‘talk (of two) → *owab-ta* ‘talk (of one, or three or more’).

DUAL in Nen, however, may also be marked, e.g. *aka-w* ‘see-DU’ vs. *aka-ta* ‘see-ND. Unlike in Marori, the DUAL vs. non-DUAL marking is systematic in Nen. Nen arguably activates DUAL as a relevant NUM feature in its grammar. Importantly, there is no specific morphology for PL in Nen: it is expressed by means of a compositional strategy making use of the available (underspecified) NUM markers. This is further discussed below.

Like Marori, Nen also shows distributed exponence for the formation of specific NUM



reference. Absolutive free pronouns show no NUM distinctions, but PERS distinction only. Bound inflectional affixes on the verb show the SG vs. NonSG distinctions. Thus, in the following examples, the specific reference of the first person singular (21a), first person plural (21b), and first person dual (21c) is determined by the combination of the first free pronoun *ynd* (unspecified for NUM) and the agreement morphology on the verb (which supplies NUM information):

- (21) a. *tog-am ynd w-aka-t-e* (Evans 2009)  
 child-ERG 1ABS 1.SG.U-see-NonDU-3sgA  
 ‘The child sees me.’
- b. *tog-am ynd yn-aka-t-e*  
 child-ERG 1ABS 1.NonSG.U-see-NonDU-3sgA  
 ‘The child sees us (3 or more).’
- c. *ämbś är-äm ynd yn-akae-w-ng*  
 one man-ERG 1ABS 1.NonSG.U-see-DU-~1.SG.A>DU.O  
 ‘One man sees the two of us.’

On the basis of the available evidence, I propose that the structure of the semantic space of NUM and related features in Nen is shown in figure 9.

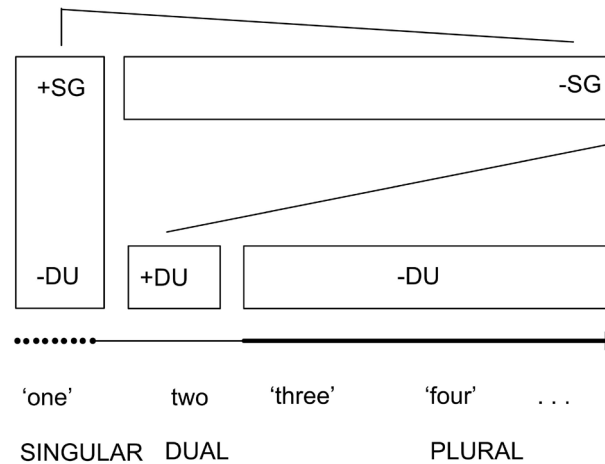


FIGURE 9. The semantic space of NUM in Nen

The analysis as depicted in figure 9 has the following advantages. First, Nen activates the feature DUAL in its NUM system. Crucially, the DUAL feature is structured as part of [-SG]. The space of DUAL ‘two’ is referable by means of [+DU].

Note that both negative (underspecified) and positive number value number may be associated with overt morphemes in Nen; e.g., the non-dual morpheme *-t* as in *w-aka-t-e* ‘1sgU-see’ (21a). In other words, we adopt an analysis where a negative value of number does not necessarily mean that it is morphologically unmarked. Conversely, a

morphologically simple form may carry a positive value of DUAL number feature lexically by default as is the case with *owab* ‘talk (of two)’.

The analysis of embedding [+DU] under the [-SG] feature in the structured semantic space finds its empirical support from the distributed exponence featuring this language. The presence of NonSG and DUAL morphemes to express DUAL as seen in (22) in the presence of a DUAL morpheme seems to be redundant at first. However, given the distributed exponence (where two exponents are needed to express DUAL), the two exponents are naturally those associated with the DUAL space, namely [+DU] and [-SG]. The space of DUAL is a specific portion of NUM space of [-SG].

- (22) *mn̄g*            *yä-trom-aran*.  
       house        3.NonSG.U-be.erected-STAT:DU  
       ‘Two houses are standing.’

Second, the space of [-DU] is split. This is consistent with the meaning of Non-DUAL (ND) and the distribution of ND morpheme in this language. For example the ND morpheme is expected to be used for plural reference. This is indeed the case; cf. [-SG] (NonSG) which combines with [-DU] (ND) in example (21b).

Third, in our analysis the spaces of two categories may overlap, e.g. the spaces of [+SG] and [-DU] in Nen. The conception of overlapping spaces is in fact significant for specific NUM reference and coding. Thus, the coding of a SG referent in Nen makes use of the exponents signifying SG and NON-DUAL as seen in (23). This is expected on the proposed structured semantic space of NUM in distributed morphology.

- (23) *mn̄g*            *y-trom-ngr*.  
       house        3.SG.U-be.erected-STAT:NonDU  
       ‘A house is standing.’

Fourth, the analysis with conception of NUM involving overlapping spaces provides a natural account for what is otherwise a peculiar strategy of coding plural and exhaustive plural/paucal in Nen.

As seen in figure 9, the space associated with Non-DUAL ([-DU]) is split into two; one overlaps with the space of [+SG] and the other with the space of [-SG]. In the latter case, it is equivalent to the space of plural (i.e. ‘three or more’). In other words, the space of plural is the portion of the space of [-SG] that is Non-DUAL ([-DU]). Since both [-SG] and [-DU] have their respective coding morphemes, it is not surprising that Nen does not need a special marker for plural. Both NonSG and NonDU morphemes are usable to encode plural, as exemplified in (24) below. Their use meets the language-specific requirement of distributive exponents in expressing NUM in this language.

- (24) *mn̄g*            *yä-trom-ngr*.  
       house        3.NonSG.U-be.erected-STAT:NonDU  
       ‘Three or more house(s) are standing.’

Finally, the expression of what Evans (2009) calls the exhaustive set/universal ‘all’, which also appears to be unusual at first, but is in fact a natural way of expressing NUM in the proposed analysis. Exhaustive set is expressed by means of singular morphology in combination with dual morphology, as seen in (25). This might be equivalent to ‘paucal’ in other languages.

The expression of exhaustive set/all must refer to the space that is complementary to the space of the non-exhaustive plural expressed by the combination of non-singular and non-dual morphemes as exemplified in (24). As seen in Figure 9 the space of the non-exhaustive plural is in the right-end of NUM space. The space for the exhaustive plural (or paucal) is logically the one in the left, including that of [+SG].

Again, due to the distributed exponence requirement of NUM expression in Nen, Nen needs no special morpheme to encode the exhaustive/paucal NUM because there are resources already available for this, namely the morphemes signifying [+SG] and [+DU], as seen in (25). However, we have to note the fact that the combination of these morphemes is not compositional: the meaning has been ‘lexicalised’ as ‘exhaustive plural’ in contrast to ‘unlimited or general plural’ expressed by the combination of non-singular and non-dual morphemes in Nen.

- (25) *mn̄g*        *y-trom-aran*.  
       house     3.SG.U-be.erected-STAT:DU  
       ‘All the houses are standing.’

**4.2. DUAL IN HOPI.** The proposed analysis for Marori and Nen can be applied to account for Hopi data. In Hopi (Hale 1997, Corbett 2000:169), the combination of SG and PL morphemes give rise to DUAL interpretation as seen in (26c). Corbett explains cases exemplified in (26c) as ‘constructed’ numbers: dual is constructed from the number on the pronoun and that on the verb.

- (26) a. *Pam*        *wari*.  
       that.SG    run.PERFV.SG  
       ‘He/she ran.’
- b. *Puma*        *yùutu*.  
       that.PL    run.PERFV.PL  
       ‘They (plural) ran.’
- c. *Puma*        *wari*.  
       that.PL    run.PERFV.SG  
       ‘They (two) ran.’

The analysis of Hopi agreement in this paper is in the same spirit as the analysis suggested by Hale (1997). He suggested that DUAL interpretation could be achieved via intersection of the two binary oppositions ([+/- SG], [+/- PL]). However, the precise detail of Hale’s analysis as to how the ‘intersection’ exactly works remains unclear. In this paper we present the analysis as a system of feature mapping onto a structured semantic space of NUM as shown in figure 10. The relevant NUM features are processed in the same way as other grammatical features in the grammar. The unification of NUM features is expected to be constrained and/or functionally motivated by the possible reference to the semantic space of NUM.

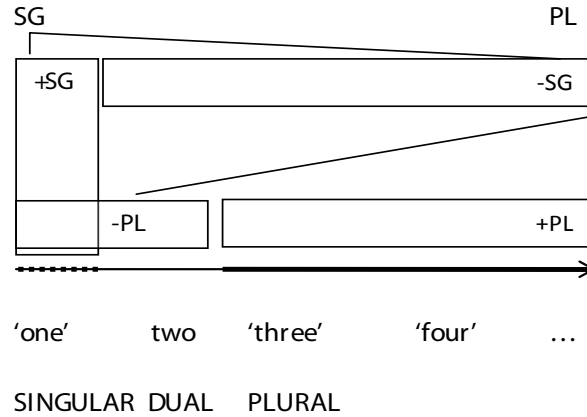


FIGURE 10. The semantic space of NUM in Hopi

Let me be specific about how DUAL in Hopi can be arrived at. It is essentially in the same way as that in Marori, but with some constraints due to the mapping onto the semantic space of NUM. First we have to specify how the NUM feature is carried by the relevant morphemes in Hopi. It should be noted that Hopi is unlike Marori in that it has no dedicated underspecified NonSG/NonPL morphemes, i.e. those carrying [-SG]/[-PL] features. Pronominal or verbal morphemes in Hopi glossed as SG/PL can be analysed as carrying feature bundles with their values as shown in figure 11.

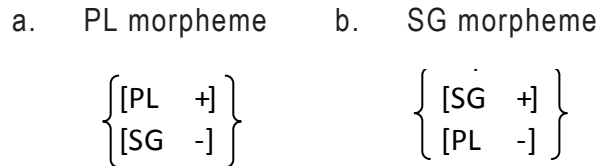


FIGURE 11

The second point of the analysis is the implication the mapping of the NUM feature onto the semantic space of NUM has in relation to the combinatory property of the grammar.

The mapping can be wide or narrow. Given the structured space in figure 10, the mapping of PLURAL morpheme (figure 11a), for example, may be associated with the space corresponding to [-SG] ('wide', including 'two'). That is, 'plural' means 'more than one'. Alternatively, the PLURAL morpheme means 'more than two'; i.e. referring to the space corresponding to [+PL] ('narrow', excluding 'two'). Likewise, the SINGULAR morpheme (figure 11b) can refer to the exact narrow space of 'one' due to its [+SG] feature, or alternatively to a wider space including 'two' due to its [-PL].

In unification-based grammar, nothing theoretically prevents the unification of [+PL] carried by the plural form and [+SG] carried by the singular form because each carries

different attributes with respective values. However, given the conception that each NUM feature is mapped onto a portion of semantic space of figure 10, the interpretation of the combinatory possibility of morphemes with [+SG] with that of [+PL] is constrained. In one interpretation, when the ‘narrow’ space is referred to, the two do not refer to a common NUM space. In the other interpretation where the wide spaces are referred to (i.e. both features [-PL] and [-SG] carried by singular and plural forms refer to the common space that includes ‘two’), then the DUAL interpretation is arrived at. The condition of the unification to arrive at DUAL interpretation in Hopi can be shown in figure 12.<sup>17</sup>

Condition: Given the NUM space of Hopi in figure 10, the space of  
[+SG] is mutually exclusive with that of [+PL] (\*i.e. [+SG]U[+PL])  
Hence:

PL		U		SG		DU
[PL	+]			[SG	+]	= [SG
[SG	-]			[PL	-]	[PL

FIGURE 12

In short, underspecified NUM features carried by SG/PL morphemes allow for wide NUM space referents. These serve as resources for combinatory purposes to refer to a specific NUM referent such as DUAL. Thus, languages such as Hopi do not need to have a dedicated morpheme for DUAL, as SG/PL forms are usable for this.

**4.3. DUAL IN LARIKE.** Larike, an Austronesian language of Maluku (Laidig & Laidig 1990), is reported to have a four-way NUM system (SG, DU, TRIAL and PL). The full sets of the four-way NUM distinction are only encountered in first, second and third person human pronominal forms. The inflection for the third person non-human is defective. The subject and object sets are shown in table 2 and table 3 respectively. (Non-pronominal forms are not inflected for NUM.)

		SG	DUAL	TRIAL	PLURAL
1	EX	<i>au-</i>	<i>aruai-</i>	<i>aridu-</i>	<i>ami-</i>
	INC		<i>ituai-</i>	<i>itidu-</i>	<i>ite-</i>
2		<i>ai-</i>	<i>iruai-</i>	<i>iridu-</i>	<i>imi-</i>
3	HUM	<i>mei</i>	<i>matuai-</i>	<i>matidu-</i>	<i>mati</i>
	NHUM	<i>i-</i>	-	-	<i>iri-</i>

TABLE 2. Subject prefixes

<sup>17</sup> While we have unification of features in figure 12, the interpretation of {[SG-][PL-]} as dual is actually associated with the notion of intersection in the semantic space of number.

		SG	DUAL	TRIAL	PLURAL
1	EX	-a/u	-arua	-aridu	-ami
	INC		-itua	-itidu	-ite
2		-ne	-irua	-iridu	-imi
3	HUM	-ma	-matua	-matidu	-mati
	NHUM	-a	-	-	-ri

TABLE 3. Object suffixes

The NUM space in Larike can be represented in Figure 13 for the following reasons. First, DUAL and TRIAL are NUM features without [+/-] value, i.e. privative. Unlike in Nen, there is no evidence in Larike that the system makes use of the opposition of DUAL vs. non DUAL. Dual and trial in Larike were (historically) derived from numeral ‘two’ and ‘three’ respectively (Laidig & Laidig 1990). They are true dual and trial forms in the sense that they refer to exact quantities of ‘two’ and ‘three’, and never used to refer to vague notion of several as is a paucal or limited plural in other languages such as Yimas (Foley 1991, Corbett 2000).

It should be noted that the consequence of the analysis adopted in this paper is that we have a hybrid feature system. As seen from figure 13, the feature system in Larike consists of SG and PL with binary values as well as privative DUAL and TRIAL. This might not be preferable as the analysis shows a proliferation of features. However, it is not clear how any alternative analysis could be offered where DUAL and TRIAL are derived from more basic features or having binary values and where language-specific patterns (further described below) are also accounted for.

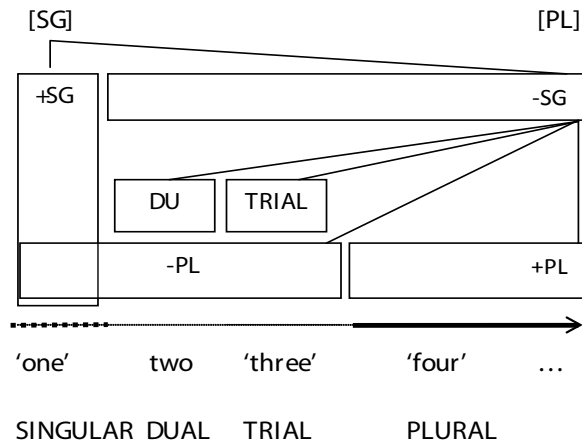


FIGURE 13. The Semantic space of NUM in Larike

Second, the plural forms in Larike may be also used when referring to quantities of two or three (Laidig & Laidig 1990). This is the evidence that the plural forms contain

[-SG, +PL] features, which allow the wide interpretation of PL. That is, its [-SG] feature allows the use of the PL form to cover the wide semantic space that includes 'two', 'three', and 'four or more'. In this case, the exact referent depends on the context. In short, the proposed analysis captures what Corbett (2000) calls the facultative nature of the PL form in Larike.

Finally, as seen from tables 2 and 3, there is a gap in the form for third person non-human. It is reported by Laidig & Laidig (1990) that it is common to use the singular non-human form to refer to a limited plural. This is expected on the analysis that a SG morpheme carries a feature bundle of [+SG] and [-PL] and that each feature can operate independently. Thus, the [-PL] feature of the SG form has its own mapping onto the semantic space of NUM that is complementary to that of [+PL]. This complementary space is in a sense 'plural' because it covers the spaces of 'two' and 'three'. It is however limited as it is contrasted with the space of PL (+PL) which, as indicated in the diagram, has no upper limit point. In short, because of the absence of DUAL/TRIAL form for the third person non-human, the SG form is naturally extended to refer to this limited plural space because the SG form carries [-PL] feature in it.

**5. CONCLUSIONS.** This paper has provided an explicit analysis of how NUM morphology is projected to syntax in Marori. It is proposed that NUM features be established on language-specific structured semantic space of NUM and that there are two basic NUM features, namely SG and PL, each with binary values. Each is possibly independently mapped onto the semantic space. It is argued that DUAL can be unmarked, analysed as [-SG,-PL]. However, DUAL can be also marked, expressed by a dedicated DUAL form. This is encountered in Nen and Larike.

It has also been demonstrated that the proposed analysis treats NUM morphemes as carrying a bundle of features, with each operating independently. This provides a natural explanation for what appears to be unusual NUM agreement or expressions as found in Nen and Hopi. The phenomena of facultative PLURAL as found in Larike can also be accounted for in the proposed analysis.

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